

**WE CLAIM:**

1. A process for detecting defects in masks comprising:  
generating an aerial image of a portion of a mask;  
generating a simulated image corresponding to original pattern data used to create  
said mask; and  
comparing said aerial image to said simulated image.
  
2. A process for detecting defects in masks as defined in Claim 1 wherein said  
simulated image is generated from original pattern data taking into account expected  
distortions and corner rounding due to image processing.
  
3. A process for detecting defects in masks as defined in Claim 1 wherein said  
simulated image is obtained by generating an aerial image of a mask design used to  
generate a portion of the mask with which it is compared.
  
4. A process for detecting defects in masks as defined in Claim 1 wherein said mask is  
generated using proximity effect correction techniques.
  
5. A process for detecting defects in masks as defined in Claim 4 wherein said mask is  
generated using optical proximity effect correction techniques.
  
6. A process for detecting defects in masks as defined in Claim 4 wherein said mask is  
generated using x-ray proximity effect correction techniques.
  
7. A process for detecting defects in masks as defined in Claim 4 wherein said mask is  
generated using ion beam proximity effect correction techniques.
  
8. A process for detecting defects in masks as defined in Claim 4 wherein said mask is  
generated using e-beam proximity effect correction techniques.

9. A process for detecting defects in masks as defined in Claim 1 wherein said photomask includes phase shifting techniques.

5 10. A process for detecting defects in masks as defined in Claim 1 wherein said mask includes proximity effect correction techniques and phase shifting techniques.

11. A process for detecting defects in masks as defined in Claim 1 wherein said mask comprises a photomask.

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12. A process for detecting defects in masks as defined in Claim 1 wherein said masks are used in the manufacture of integrated circuits.

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13. A process for detecting defects in masks as defined in Claim 1 wherein said mask comprises an x-ray mask.

14. A process for detecting defects in masks as defined in Claim 1 wherein said mask comprises a stencil mask for ion projection lithography.

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15. A process for detecting defects in masks as defined in Claim 1 wherein said mask comprises a mask for electron beam projection lithography.

16. A process for detecting defects in masks as defined in Claim 1 wherein said aerial image and said simulated image are generated out of focus.

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17. A process for detecting defects in photomasks comprising:  
generating an aerial image of a portion of a photomask;  
generating a simulated image corresponding to original pattern data used to create  
said photomask; and  
30 comparing said aerial image to said simulated image.

18. A process for detecting defects in photomasks as defined in Claim 16 wherein said simulated image is generated from original pattern data taking into account expected distortions and corner rounding due to image processing.

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19. A process for detecting defects in photomasks as defined in Claim 16 wherein said simulated image is obtained by generating an aerial image of a mask design used to generate the portion of the photomask with which it is compared.

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20. A process for detecting defects in photomasks as defined in Claim 16 wherein said photomask is generated using optical proximity effect correction techniques.

21. A process for detecting defects in photomasks as defined in Claim 16 wherein said photomask includes phase shifting techniques.

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22. A process for detecting defects in photomasks as defined in Claim 16 wherein said photomask includes proximity effect correction techniques and phase shifting techniques.

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23. A process for detecting defects in photomasks as defined in Claim 16 wherein said aerial image and said simulated image are generated out of focus.

24. An apparatus for detecting defects in photomasks comprising:  
an aerial image measurement system for generating an aerial image of a portion of a photomask;  
a simulated image generating system for generating a simulated image corresponding to original pattern data of said photomask; and  
a comparator for comparing said aerial image and said simulated image.

25. An apparatus for detecting defects in photomasks as defined in Claim 22 wherein

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said image simulator comprises an aerial image measurement system.

26. An apparatus for detecting defects in masks comprising:  
means for generating an aerial image of a portion of a mask;  
means for generating a simulated image corresponding to original pattern data  
used to create said mask; and  
means for comparing said aerial image with said simulated image.
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27. An apparatus for detecting defects in photomasks comprising:  
means for generating an aerial image of a portion of a photomask;  
means for generating a simulated image corresponding to original pattern data  
used to create said photomask; and  
means for comparing said aerial image with said simulated image.
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